Occupational Risk Assessment and Management in a System Approach: the Why and the How

UCL Université catholique de Louvain

European Safety, Reliability & Data Association

CTMA Centre de Technologies Moléculaires Appliquées

The 49th ESReDA Seminar on:

Innovation through Human Factors in Risk Assessment and Maintenance

October 29-30, 2015, Clos Chapelle-aux-Champs, B-1200, Brussels, Belgium

PRELIMINARY PROGRAM

28/10/2015: ESReDA PRIVATE MEETINGS

15:00-18:00 **ESReDA Board of Directors Meeting**
20:30-23:00 **TPC private dinner**

29/10/2015: 1ST DAY

08:15 - 09:00 **Registration**
09:00 - 09:30 **Welcome & Opening**

Session S1a: Human and Organisational factors
Chaired by: Sean Reed, Evanthia Giagloglou

9.30 – 9.50 **Methods, Techniques and Tools to Understand Human Error in Industrial Activities: a review**
José Sobral, Edgar Serrano - ISEL – Instituto Superior de Engenharia de Lisboa, Lisboa, Portugal
Luis Ferreira - FEUP – Universidade do Porto Faculdade de Engenharia, 4200-465 Porto, Portugal

9.50 - 10.10 **Human error views: A framework for measuring the distance between academia and Industry and benchmarking organisations**
Nektarios Karanikas - Amsterdam University of Applied Sciences, Aviation Academy, Amsterdam, The Netherlands

10.10 - 10.30 **InnHF - Innovation through Human Factors in Risk Assessment and Maintenance**
M. Demichela - Dept. Scienza Applicata e Tecnologia Politecnico di Torino, Italia
M.C.Leva – Centre for Innovative Human Systems, Department of Psychology, Trinity College Dublin, Eire

10:30 -10:50 Coffee Break

Session S1b: Human and Organisational factors
Chaired by: Luis Ferreira, Micaela Demichela

10.50 - 11.10 **Application of HEART (Human Error Assessment & Reduction Technique) methodology to assess the human risk factor – nuclear power plant context**
Picand Sébastien - ALSTOM Power SA, Levallois-Perret, France

11.10 – 11.30 **Improving Safety through gaming: A serious game's application for risky professions**
Evanthia Giagloglou, Ivan Macuzic - University of Kragujevac, Kragujevac, Srbija
Panagiotis Antoniou, Panagiotis Bamidis - Aristotle University, Thessaloniki, Greece

11.30-11.50 **Predicting the Optimal Testing Strategy for Maintenance Procedures**
Yang Zhang, Sean Reed and John Andrews - Centre for risk and Reliability Engineering, University of Nottingham
Magnus Karlberg, Faste Laboratory - Lulea University of Technology

11.50 - 12.10 **Human Reliability Assessment – A crtical review of the current status tracing a roadmap for future development**
Costanza Ciarapica Alunni, Maria Chiara Leva, Nora Balfe - Centre for Innovative Human Systems, Department of Psychology, Trinity College Dublin, Eire

12.10 - 12.30 **Advanced model for safety oriented man-workplace system management in automotive industry**
Alberto Petruni, Ivan Mačužić - Faculty of Engineering, University of Kragujevac, Srbija
Nikolić Saša - Environment, Health & Safety, FCA Srbija doo Kragujevac, Srbija

12:30 -14:00 Lunch

Session S2: Measurements, observation and data treatment
Chaired by: Chiara Leva, Mohamed Eid

14.00 – 14.20 **Ergonomics of pushing and pulling: a training cart prototype**
Evanthia Giagloglou, Ivan Macuzic, Milan Radenkovic, Marko Milosevic and Branislav Jeremic - University of Kragujevac, Kragujevac, Srbija

14.20 – 14.40 **Neuroergonomics Studies of Monotonous and Repetitive Operations on Manual Assembly Tasks**
Pavle Mijović, Ivan Mačužić, Ivan Gligorijević, Petar Todorović and Branislav Jeremić - Department for production engineering, Faculty of Engineering, University of Kragujevac, Serbia
Vanja Ković, Miloš Milovanović, Miroslav Minović - University of Belgrade, Serbia
Maarten De Vos - Department of Engineering, Institute of Biomedical Engineering, University of Oxford, UK

14.40 – 15.00 **Behavioural yoga for pilots: Enabling good airmanship as a resilience strategy for civil flight operations**
Frederik Mohrmann - National Aerospace Laboratory, Amsterdam, The Netherlands,
John Stoop - Kindunos Consultancy, Gorinchem, The Netherland

15.00 – 15.20 **Maintenance in a passenger transportation company in Poland and in the Republic of South Africa**
Marta Nowakowska, General Tadeusz Kosciuszko - Military Academy of Land Forces, Wrocław, Poland
Agnieszka Tubis - Wrocław University of Technology, Wrocław, Poland

15:20 - 15:40 Coffee Break

Session S3: Lessons learned and use of the information gained
Chaired by: Nicolas Dechy, John Stoop

15.40 - 16.00 **Occupational Risk Assessment and Management in a System Approach: the Why and the How**
Elisabetta de Cillis, Paolo Fargione, Davide Labagnara, Luisa Maida, Carla Masucci, Mario Patrucco - Dipartimento di Ingegneria dell'Ambiente, del Territorio e delle Infrastrutture, Politecnico di Torino, Italia;
Roberto Luzzi - Inail-CONTARP, Direzione Regionale Piemonte, Torino, Italy

16.00 - 16.20 **Occupational accident pre-cursors management systems**
Lorenzo Comberti, Gabriele Baldissone, Serena Bosca, Micaela Demichela - Dipartimento di Scienza Applicata e Tecnologia Politecnico di Torino, Italia

16.20 - 16.40 **Development of a Methodology for assessing Safety & Operational Reporting within Safety Critical Industries**
Ewan Douglas, Sam Cromie, Maria Chiara Leva - Centre for Innovative Human Systems, Department of Psychology, Trinity College Dublin, Eire

16.40 - 17.00 **The management of safety in complex organisations**
Rota G - SIAD, Bergamo, Italy

17:00 - 18:00 Supervisory Board InnHF Project

20:00 - 23:30 Seminar Gala Dinner (location to be defined)

30/10/2015: 2ND DAY

Session S4: Safety and HOF management for maintenance
Chaired by: Piero Baraldi, Sean Reed

9:00 - 9:20 **Assessment of safety management of maintenance outages: a human and organisational factors approach**
Dechy N., Thellier S., Rousseau J-M., Pansier J., Jeffroy F. - Institut de Radioprotection et de Sûreté Nucléaire (IRSN), France

9.20 - 9.40 **Reducing the human factor in servicing of equipment at the enterprises that use WCM**
Kushch S. - FCA Srbija doo Kragujevac, Srbija,
Demichela M., Milosevic M. - Dipartimento di Scienza Applicata e Tecnologia Politecnico di Torino, Italia

9.40 - 10.00 **The Development of a Maintenance Process Performance Model and Modelling Language**
Yang Zhang, Sean Reed and John Andrews - Centre for risk and Reliability Engineering, University of Nottingham
Magnus Karlberg, Faste Laboratory - Lulea University of Technology

10.00 – 10.20 **Supporting Maintenance Decision with Empirical Models Based on Fleet-Wide Data**
Sameer Al-Dahidi, Francesco Di Maio, Piero Baraldi, Enrico Zio - Energy Department, Politecnico di Milano, Italy

10.20 – 10.40 **Towards the Integration of Human Reliability Analysis and Maintenance Prognostics within the Biopharmaceutical Industry**
Darren McDonnell, Garret E. O'Donnell, Nora Balfe - Trinity College Dublin, Ireland
Piero Baraldi, Ivan Bani - Energy Department, Politecnico di Milano, Italy

10:40 -11.00 Coffee Break

Session S5: PHM and maintenance
Chaired by: Micaela Demichela, Henrik Kortner

11.00 – 11.20 **Early fault detection and diagnosis in bearings for improved reliability and safety in packaging materials industry**
Dragoljub Gajić, Jovan Gligorijević , Aleksandar Brković, Željko Đurović - Tetra Pak Production d.o.o., Serbia

11.20 – 11.40 **Initial spare parts assortment decision making: a structured approach for rolling stock maintenance**
A.J.J. Braaksma, L.A.M van Dongen, A. Martinetti, J. Ziggers - Universiteit Twente. Enschede, The Netherlands

11.40 – 12.00 **Avoiding Human Error through Easy Readable Spectra provided by Zhao Atlas Marks Distribution for Monitoring Rolling-Element Bearings**
Christos Tsiafis, Evanthia Giagloglou, Petar Todorovic, - Department for Production Engineering, Faculty of Engineering, University of Kragujevac, Serbia
Christos Skeberis, Zaharias Zaharis, Ioannis Tsiafis, Thomas Xenos - Aristotle University of Thessaloniki, Greece

12.00 – 12.20 **Validating the calculated Performance of Dutch Storm Surge Barriers and other Infrastructures by Process and Organizational Assessment**
G.R. Kleijn van Willigen, Rijkswaterstaat
H. van Meerveld, TNO

12.20 – 12.40 **Sensitivity analysis of a time-to-crack-initiation corrosion model for a carbonated reinforced concrete.**
Bejarano Pablo, de Larrard Thomas, Casaux-Ginestet Géraldine, Duprat Frederic - LMDC, UPS – INSA Toulouse, France

12:40 -14:00 Lunch

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Session S6: Methods and application for HOF and risk assessment
Chaired by: Micaela Demichela, Luis Ferreira

14.00 - 14.20 **Structured risk analysis for equipment subject to pressure equipment directive on distillation column example including human and organizational factors**
Marko Djapan, Micaela Demichela, Dept. Applied Science and Technique, Politecnico di Torino, Italy
R. L. B. Raoni - Universidade Federal do Rio de Janeiro, Brasil

14.20 - 14.40 **Integration of Human and Organizational Factor into ATEX (Explosive Atmosphere) Risk Assessment: The ATEX-HOF Methodology and Its Application**
Jie Geng, Salvina Murè, Gianfranco Camuncoli - ARIA s.r.l., Torino, Italia
Micaela Demichela, Baldissone Gabriele - Dipartimento di Scienza Applicata e Tecnologia Politecnico di Torino, Italia

14.40 - 15.00 **Introduction of the human factor into the risk analysis**
J.R. González Dan, Josep Arnaldos, R.M. Darbra - Chemical Engineering Department. Universitat Politècnica de Catalunya-BarcelonaTech, Barcelona, Catalonia, Spain.

15.00 - 15.20 **Wider approach in the Food Safety Risk Management, involving Human Factor**
Shirani M., Demichela M. - Dipartimento di Scienza Applicata e Tecnologia Politecnico di Torino, Italia

15.20 – 15.40 **Integration of Human and Organizational Factors with Quantitative Risk Assessment based on Accident Investigation**
Mehmood Ahmad, Marco Pontiggia, D'Appolonia S.p.A., San Donato M.se, Milan, Italy
Micaela Demichela, Dipartimento di Scienza Applicata e Tecnologia Politecnico di Torino, Italia
Maria Chiara Leva - Trinity College Dublin, Ireland

15.40 - 16.00 **Human factor engineering for design project in oil and gas: lessons learnt from a case study**
Farzad Naghdali, Maria Chiara Leva, Sam Cromie - Centre for Innovative Human Systems, Department of Psychology, Trinity College Dublin, Eire

16.00 - 16:30 Closure & announcement of the 50th ESReDA seminar

Occupational Risk Assessment and Management in a System Approach: the Why and the How

Elisabetta de Cillis([a]), Paolo Fargione([a]), Davide Labagnara([a]), Luisa Maida([a]), Carla Masucci([a]), Mario Patrucco([a])
Roberto Luzzi([b])

[a] Dipartimento di Ingegneria dell'Ambiente, del Territorio e delle Infrastrutture -DIATI-, Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129, Torino, Italia;
[b] Inail-CONTARP, Direzione Regionale Piemonte – Corso Orbassano 366, 10137, Torino, Italy

Abstract

Occupational Safety and Health - OS&H problems still remain an important criticality in many Statistical classification of economic activities in the European Community - NACE sectors in Italy. Even if the official Italian statistical data published by National Institute for Work Injury Insurance - Inail show some fluctuations in the yearly accident and health impairment rates, the 3 fatalities/day figure proves difficult to modify, and the number of traditional and new professional diseases remains very impressive (officially approximately 2/year deadly diseases).
An extensive and in deep analysis of a number of case histories, carried out by means of an innovative technique (namely the Computer aided Cause Consequence for Prevention - CCCP approach) conclusively proved that this unacceptable scenario results from the following causes:
a - Hazard Factors (situations, materials, substances, organization, reasonably predictable faults and errors in terms of Worst Credible Case - WCC, etc.) poor Identification, directly involving the absence of special prevention countermeasures;
b – Poor Risk Assessment, involving under or overestimation of the seriousness of some safety problems, and hence a misguided organization of the prevention;
c – Poor Risk Management, basically in terms of lacking internal/external audits of situations/operations vs the Risk Assessment results, lacking risk assessment revision in case of scenery modifications, and lacking conservation along the time of the safety measures resulting from the risk assessment.
A side cause of the modest success of the actions aimed to modify the previously mentioned concerning occupational safety scenery is that the Heinrich approach (prevention can be implemented from information on the frequency of deviations from a correct working situation) is applied in a generalized way without discussion. But the Heinrich model is based on a "Person Approach" (the misconduct of victims or colleagues is the main cause of deviation, in spite of the obvious consideration that they and they only are in direct contact with the Hazard Factor).
A Guideline based on a System Approach (the system approach concentrates on the conditions under which individuals work and tries to build defences to avert errors or mitigate their effects) was developed and successfully tested in a number different situations.
The basic principia of the guideline, coherent with both the 89/391 EEC Directive and the OS&H in quality criteria, can be summarized in a 3E list:
E1 - Engineering: Prevention through Design – PtD, focused to guarantee the highest safety level technically achievable through comparative analysis of alternative solutions, and the possible faults, human errors included (a formal demonstration is necessary);
E2 - Education: information, education and training actions at every hierarchic level, derived from a Risk Assessment and Management specially conceived for the situation under exam;
E3 - Enforcement: checking with internal/external audits the preservation through time of the safety level made possible by the PtD approach, and consideration of further improvements made available by the technical and epidemiology improvements.
The paper discusses the previous aspects, and the Why and the How of the suggested Occupational Risk Assessment and Management technique in a System Approach.